SOME NEW AIRCRAFT TYPES

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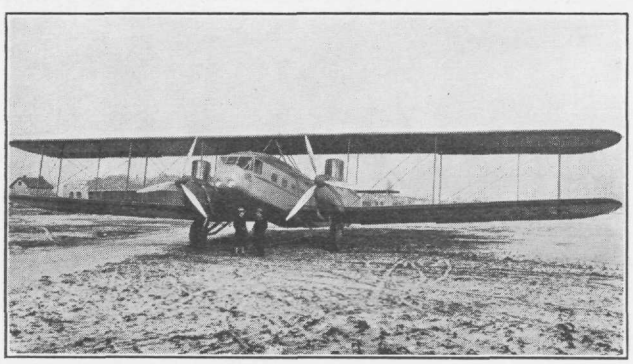
The past year has been very productive so far as new aircraft types are concerned. There have been departures from the old established rules for design, as there should be, and not all of them have been even partially successful. However, a number of new planes have been put on the market and some of them have been able to weather the period of industrial depression. These new planes have been developed in every field from that of the light sport and training ship to the massive transport and air liners. The Guggenheim Safe Aircraft Competition has done more to stimulate new developments along this line than any other single thing during the past year.

Before discussing in detail the types brought out for entry in the Guggenheim contest it might be well to read over the tests which the planes were required to pass before they could compete for the prizes which aggregated $150,000.00. At the first announcement of the competition many designers professed their intention to enter planes but a study of the requirements caused the great majority of them to change their minds. The tests were as follows:

1. The aircraft must maintain level and controlled flight at a speed not greater than 35 miles an hour and must be able to glide for three minutes with all power switched off, at a speed not to exceed 38 miles an hour.
2. The aircraft must come to a complete stop within 100 feet of the spot where it first touches the ground in landing.
3. A steady glide must be made over an obstruction 35 feet high and the aircraft must come to a complete stop within 300 feet of the base of the obstruction. This is to test the ships ability to make a forced landing in a small space surrounded by wires, houses or trees.
4. The aircraft must take off after not more than a 300 foot start along the ground and must then clear a 35-foot-high obstruction 500 feet from the starting point.
5. To test its ability to approach an uncertain landing place in event of engine failure, the aircraft, with all power switched off, must glide at an angle of not more than 8 degrees to the horizon and must also be able to glide at an angle of more than 16 degrees to the horizon at a speed not greater than 45 miles an hour.
6. In normal flight, at a speed of 45 to 100 miles an hour, the pilot must take both hands off the controls, leaving them entirely free for at least 5 minutes to demonstrate the ability of the craft to right itself after disturbances from wind gusts or from the application of controls.
7. The aircraft must show that if the engine suddenly fails on a steep climb, no abnormal attitude, such as a stall followed by a nose dive, will result and that the craft will descend on a steady, easy glide, without intervention by the pilot. A frequent error following engine failure is the pilot's tendency to pull back on his controls instead of nosing down the craft into a glide. The aircraft must demonstrate that it is foolproof against such an error, and one of the tests requires that the power shall be switched off on the climb, the elevator control pulled back toward the maximum extent, and that the craft shall under such conditions, descend on a steep glide at a speed of not more than 40 miles an hour and under perfect control.
8. The ship must be provided with three controls, which are independently effective about corresponding axes of the aircraft at all attitudes.
9. The aircraft must show its ability to take off and to land on a plot 500 feet square surrounded by a 25-foot obstruction. To test this properly a portion of the field will be marked off, and four observers placed 25 feet above the ground will sight across the boundaries of the plot. After the craft has left the ground, the observer will switch off the engine when he pleases, and the pilot will land the craft within the square without passing through the imaginary obstruction. The test will demonstrate the ability of the craft to use restricted territory with bad approaches. The aircraft must be able to taxi under its own power in any direction in a wind whose mean speed is at least 20 miles an hour.



18 Passenger Curtiss "Condor"

These requirements are enough to give any aeronautical designer a bad chill. The prize was won by the Curtiss Aeroplane and Motor Company with their Curtiss "Tanager" which was the only ship entered in the contest which could pass all the above requirements.

It seems fitting that, in view of the last named fact, we should first discuss the Curtiss "Tanager."

Basically the "Tanager" is a three-place cabin biplane departing from conventional design principally by the addition of three safety devices—an entirely new type of aileron, automatic wing slots and controllable wing flaps. While the ailerons may be moved relative to each other in maneuvering the plane, they are automatic in every other respect for regardless of the plane's altitude or position in the air, they at all times automatically assume a position parallel to the air currents set up by the motion of the plane in flight. These ailerons insure control in a stall as well as during normal flight, reduce yawing and spinning tendencies, and make rudder correction and control unnecessary. They are mounted at the tips of the lower wing where they operate in air undisturbed by the wings and where they do not disturb the lifting characteristics of the wings. At high speed the tip of the lower wing fairs into the aileron section giving clean streamlining. The mechanism which operates this aileron is as simple as normal aileron control.

Front slots and controllable rear flaps are fitted along the entire length of the wing. Each flap has a small aperture forward of its leading edge, which prevents the flap from reaching the burble point at the high angles necessary for maximum lift. Tunnel tests were made in order to secure the best lift when using automatic slots, and a new type of roller support was developed in this connection. This installation is entirely automatic and is easily adjusted so that all slots over the span open simultaneously. The slots start opening at about 12 degrees angle of attack of the airplane; they open gradually to their maximum position of 16 degrees. There is no sudden open-

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ing, and since they are provided with buffers, there is no jar caused by their operation. Flaps at the trailing edge of the wing are operated by a hand crank, the only added control.

The "Tanager" has been landed repeatedly from a height of 200 feet by rolling the stabilizer all the way tail heavy, pulling the stick all the way back and holding this position until the landing is effected. This condition will throw many ships into a spin. When the controls are in these positions the "Tanager" settles in a landing attitude and lands itself with no greater shock to the ship than accompanies a normal landing. The engine is a six cylinder, staggered, radial air-cooled Curtiss Challenger of 170 h.p. and is fitted with short exhaust stacks. The plane has a high speed of 110 miles an hour and a minimum speed of 35 miles an hour. Its absolute ceiling is 15,000 feet.

Other planes entered in the Guggenheim competition but unable to meet all the requirements were a Cunningham-Hall, Ford-Leigh, Uppercu-Burnelli, Handley-Page, Schroeder-Wentworth, and Taylor Brothers.

A new plane recently introduced by an established company is the Boeing "Monomail." It is a low wing monoplane of all-metal construction and is characterized by its ability to carry large pay loads at high speed. The ship is equipped with retractable landing gear. Powered with a Pratt & Whitney Hornet, Series B, rated at 575 h.p. at 1,950 r.p.m., the plane can make 158 miles an hour and cruises at 140. Its landing speed is 60 miles an hour. With a cruising radius of 600 miles the plane can climb 850 feet per minute. Its service ceiling is 14,000 feet.

There has sprung up in the last year a number of very small, light planes of either one or two passenger capacity. Among these is the new American Eaglet Monoplane. This ship, manufactured by the American Eagle Aircraft Corporation of Kansas City, is a featherweight parasol monoplane built in either one or two place models. Powered with a Cleone, two cylinder engine of 25 h.p. it has a speed of approximately 60 miles per hour. This is the one place model. The two place Eaglet uses a three cylinder Szekeley engine of 35 h.p. The landing gear is a conventional rigid inverted V type and is equipped with 7″ x 16″ Airwheels on 4-inch hubs.

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The ship's payload is 175 lbs. and it can cruise under this load for 3½ hours. The American Eaglet will sell for $995 with the Cleone powerplant and $1,395 with the Szekeley.

Transport ships also come in for their share of the new developments. One of the most notable planes of this type recently built is the all-metal Burnelli transport. Built to carry 20 passengers and two pilots, the new ship borders closely on the flying wing principle. The fuselage is of airfoil contour 12′ wide x 36′ long x 6′ 8″ deep, and has rectangular cross section. In plan it tapers from 12 feet at the rear of the cabin section to 7′ 6″ at the trailing edge, from which the tail outriggers are attached. All main wing, landing gear, and tail fittings are of heat treated chrome-molybdenum steel or forgings of similar material. 46″ x 20″ Goodyear Airwheels with brakes are installed. They use only 12 lbs. pressure and provide safe bearing surface to allow landing on a soft surface. Two 600 h.p. water cooled motors are used mounted side by side in the unusually wide nose of the ship. The pilot's cockpit is in front of the cabin and is of the open type. When loaded the gross weight of the monoplane is 17,000 pounds.

Probably the most peculiar looking new plane is the Curtiss-Bleecker Helicopter. This machine consists essentially of four large wings or blades mounted at right angles to each other and revolving in a horizontal plane. The wings are revolved by means of four four-bladed propellers, one mounted forward of the leading edge of each wing, about nine feet from the center of the machine. The propellers are driven through a gear and shaft arrangement from one central Pratt & Whitney Wasp air-cooled engine which is mounted horizontally with the propeller shaft pointing upward. To each of the wings are attached outriggers on which are mounted elevators or tail surfaces. The fuselage is in the form of a small car mounted beneath the wings, the pilot's cockpit in front of the center attachment and the passenger's place behind. Conventional stick and rudder controls are used. Although tests have not been completed, the normal high speed is expected to be about 70 miles per hour.

One of the few American-built low wing cabin monoplanes is the Alexander "Bullet," produced

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by the Alexander Aircraft Co. It is powered with a Wright J-6 5-cylinder, 165 h.p., radial engine and carries four people. During flight tests the Bullet took off in 17 seconds with full load. Among the plane's features are a retractable landing gear with a double safety lock to be used when the gear is in extended position. The landing gear is of the combination spring and eleo type; visibility is excellent from all seats. The "Bullet" has a high speed of 148 m.p.h., cruises at 124 and lands at 48.

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